US007075673B2

(12) **United States Patent**
Lech et al.

(10) **Patent No.:**   **US 7,075,673 B2**
(45) **Date of Patent:**   **Jul. 11, 2006**

(54) **INFORMATION PROCESSING METHODOLOGY**

(75) Inventors: **Robert Lech**, Jackson, NJ (US);
Mitchell A. Medina, New York, NY
(US); **Catherine B. Elias**, Plainsboro,
NJ (US)

(73) Assignee: **EON-Net L.P.**, Tortola (VG)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 34 days.

(21) Appl. No.: **10/704,484**

(22) Filed: **Nov. 6, 2003**

(65)   **Prior Publication Data**

US 2004/0070793 A1   Apr. 15, 2004

Related U.S. Application Data

(60)   Continuation of application No. 09/458,162, filed on
Dec. 9, 1999, now Pat. No. 6,683,697, which is a
continuation of application No. 09/044,159, filed on
Mar. 19, 1998, now Pat. No. 6,094,505, which is a
continuation of application No. 08/487,150, filed on
Jun. 7, 1995, now Pat. No. 5,768,416, which is a
division of application No. 08/348,224, filed on Nov.
28, 1994, now Pat. No. 5,625,465, which is a con-
tinuation of application No. 08/143,135, filed on Oct.
29, 1993, now Pat. No. 5,369,508, which is a con-
tinuation of application No. 07/672,865, filed on Mar.
20, 1991, now Pat. No. 5,258,855.

(51) **Int. Cl.**
H04N 1/40   (2006.01)

(52) **U.S. Cl.** **358/1.15**; 382/175
(58) **Field of Classification Search** 358/1.15;
382/175, 177, 180, 282, 287, 306, 317
See application file for complete search history.

(56)   **References Cited**

U.S. PATENT DOCUMENTS

3,013,718 A	12/1961	Shepard et al.
3,200,372 A	8/1965	Hamburgen
3,303,463 A	2/1967	Hamburgen
3,434,110 A	3/1969	Bucklin, Jr. et al.
3,492,653 A	1/1970	Fosdick et al.
3,582,883 A	6/1971	Shepard
3,582,884 A	6/1971	Shepard

(Continued)

FOREIGN PATENT DOCUMENTS

EP   0 107 083 B1   7/1988

(Continued)

OTHER PUBLICATIONS

PC Magazine, vol. 5, No. 16, Sep. 30, 1986.

(Continued)

*Primary Examiner*—Thomas D. Lee
Assistant Examiner—Stephen Brinich
(74) *Attorney, Agent, or Firm*—Foley & Lardner LLP

(57)   **ABSTRACT**

An information processing methodology gives rise to an
application program interface which includes an automated
digitizing unit, such as a scanner, which inputs information
from a diversity of hard copy documents and stores infor-
mation from the hard copy documents into a memory as
stored document information. Portions of the stored docu-
ment information are selected in accordance with content
instructions which designate portions of the stored document
information required by a particular application program.
The selected stored document information is then placed
into the transmission format required by a particular appli-
cation program in accordance with transmission format
instructions. After the information has been transmission
formatted, the information is transmitted to the application
program. In one operational mode, the interface interactively
prompts the user to identify, on a display, portions of the
hard copy documents containing information used in appli-
cation programs or for storage.

57 Claims, 15 Drawing Sheets
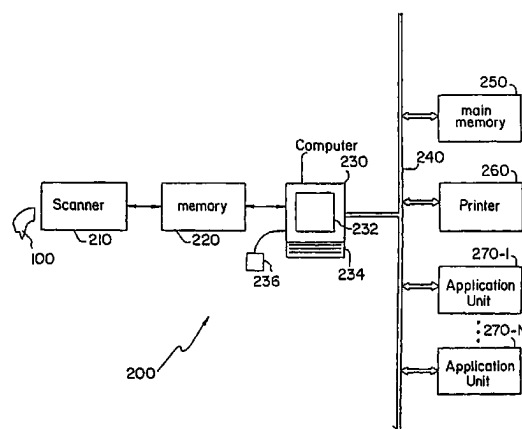
US 7,075,673 B2

Page 2

U.S. PATENT DOCUMENTS

3,584,144 A	6/1971	Shepard et al.	
3,631,396 A	12/1971	Spertus	
3,832,682 A	8/1974	Brok et al.	
3,848,228 A	11/1974	MacNeill	
3,903,517 A	9/1975	Hafner	
RE29,104 E	1/1977	Shepard	
4,021,777 A	5/1977	Shepard	
4,034,343 A	7/1977	Wilmer	
4,041,454 A	8/1977	Shepard et al.	
4,047,154 A	9/1977	Vitols et al.	
4,132,978 A	1/1979	Mercier	
4,387,964 A	6/1983	Arrazola et al.	
4,553,261 A	11/1985	Froessl	
4,564,752 A	1/1986	Lepic et al.	
4,572,962 A	2/1986	Shepard	
4,593,367 A	6/1986	Slack et al.	
4,659,940 A	4/1987	Shepard	
4,667,248 A	5/1987	Kanno	
4,672,678 A	6/1987	Koezuka et al.	
4,760,246 A	7/1988	Shepard	
4,760,606 A	7/1988	Lesnick et al.	
4,776,016 A *	10/1988	Hansen	704/275
4,782,509 A	11/1988	Shepard	
4,802,104 A	1/1989	Ogiso	
4,802,231 A	1/1989	Davis	
4,803,734 A	2/1989	Onishi et al.	
4,931,957 A	6/1990	Takagi et al.	
4,933,979 A	6/1990	Suzuki et al.	
4,974,260 A	11/1990	Rudak	
5,017,763 A	5/1991	Shepard	
5,031,121 A	7/1991	Iwai et al.	
5,034,990 A	7/1991	Klees	
5,052,038 A	9/1991	Shepard	
5,095,445 A	3/1992	Sekiguchi	
5,140,139 A	8/1992	Shepard	
5,140,650 A	8/1992	Casey et al.	
5,153,927 A	10/1992	Yamanari	
5,159,667 A	10/1992	Borrey et al.	
5,191,525 A	3/1993	LeBrun et al.	
5,218,539 A	6/1993	Elphick et al.	
5,228,100 A	7/1993	Takeda et al.	
5,245,166 A	9/1993	Shepard	
5,251,268 A	10/1993	Colley et al.	
5,257,328 A	10/1993	Shimizu	
5,258,855 A	11/1993	Lech et al.	
5,282,267 A	1/1994	Woo, Jr. et al.	
5,307,424 A	4/1994	Kuehl	
5,367,619 A	11/1994	Dipaolo	
5,404,294 A	4/1995	Kamik	
5,416,849 A	5/1995	Huang	
5,444,840 A	8/1995	Froessl	
5,448,738 A	9/1995	Good et al.	
5,452,379 A	9/1995	Poor	
5,455,875 A	10/1995	Chevion et al.	
5,506,697 A	4/1996	Li et al.	
5,511,135 A	4/1996	Rhyne et al.	
5,526,447 A	6/1996	Shepard	
5,550,930 A	8/1996	Berman et al.	
5,555,325 A	9/1996	Burger	
5,696,854 A	12/1997	Shepard	
5,734,761 A	3/1998	Bagley	
5,852,685 A	12/1998	Shepard	
5,923,792 A	7/1999	Shyu et al.	
5,933,531 A	8/1999	Lorie	
6,067,517 A *	5/2000	Bahl et al.	704/256
6,094,505 A	7/2000	Lech et al.	

FOREIGN PATENT DOCUMENTS

JP	64-38883	2/1989
JP	3-161886	7/1991

OTHER PUBLICATIONS

TopScan Professional User's Guide, Calera Recognition Systems, pp. v-vii, xi-xiii, and 1-6, 1989.

Que's Computer user's Dictionary, 2nd Ed., Bryan Pfaffenberger (author); 1991; p. 144.

"Kurzwell 5200 Intelligent Scanning System", Xerox Imaging Systems, Inc., 1990.

Edward O. Welles, *Decisions, Decisions*, Inc., Aug. 1990, pp. 80-90.

Palantir PagePro User's Guide, Rev. A, Dec. 1986, sections 1 and 4 and Appendix C.

PageRead Library Developer's Guide, Rev. B, Aug. 1989, pp. PRL1-3, SHC25-26, TUT9-10.

With AutoClass there is no more to Indexing than OCR, Remittance and Document Processing Today, Nov.-Dec. 1990, p. 46.

Daniel Borrey, *Machine Recognition and Classification of Documents*, Remittance and Document Processing Today, Nov.-Dec. 1990, pp. 20-23.

The Very Best in Optical Character Recognition, IMAGING, Mar. 1992, pp. 43-47.

Why Insurance Companies Take the Risk on Document Imaging, IMAGING, Mar. 1992, pp. 48-54.

"OCR for Forms" (advertisement), IMAGING, Apr. 1992.

David Black, *The Right and The Wrong Ways to Index*, IMAGING, May 1992, pp. 47-50.

Greg Bartels, *How to Successfully Convert Your Backfiles*, IMAGING, May 1992, pp. 55-56.

But, Is It a Boy or Girl? IMAGING, Oct. 1992, p. 10.

Gerry Frieser, *Suddenly, OCR is a "Must Buy"*, IMAGING, Dec. 1992, pp. 22-25.

14 of the Hottest OCR Software Packages and Systems, IMAGING, Dec. 1992, pp. 26-31, 33, 35.

How Form Processing Works, Plus Pros and Cons, IMAGING, Dec. 1992, p. 36.

Forms Processing Products Meet the Challenge of OCRing Forms, IMAGING, Dec. 1992, p. 38-40.

Herbert F. Schantz, *Forms Automation and Integrated Imaging (OCR) Systems*, Remmittance and Document Processing Today, Mar. -Apr. 1991, pp. 9-11.

Don Merz, *OCR: A Health Insurance Application*, Remittance and Document Processing Today, Jul.-Aug. 1989, pp. 18-20.

Industry News, Remittance and Document Processing Today, Jul.-Aug. 1989, p. 22.

Industry News and New Products, Remittance and Document Processing Today, Oct. 1984, pp. 17-18.

R. C. Gonzalez, *Designing Balance Into An OCR System*, Remittance and Document Processing Today, Mar. 1988, pp. 7, 10-11.

Ambrose R. Rightler, *OCR Qualtiy Control Procedures for Remittance Processing: Can You Afford to be Without It?* Remittance and Document Processing Today, Mar. 1988, pp. 12-15.

Product Watch, MACWEEK, Oct. 3, 1989, pp. 32, 34, 38, 40, 42.

Industry News, Remittance and Document Processing Today, Jan. 1989, p. 9.

Scott Beamer, *Mac OCR Takes a Big Step Forward*, MACWEEK, Jun. 13, 1989.

Matthew Lake, *Strength of Character (Recognition)*, PUBLISH, Jan. 1991, pp. 62-67.

R. David Nelson and Karen A. Hamill, *Optical Scanning at Chemical Abstracts Service for Building Computer Files*

US 7,075,673 B2

Page 3

From Printed Index Data, Recognition Technologies Today, Feb. 1985, pp. 1-6, 15.

Gerald Farmer, *HNC IDEPT9 and Recognition Enhanced Data Entry: The Cost-Cutting Approach to Automaated Data Entry*, Remittance and Document Processing Today, Jan.-Feb. 1991, pp. 24-26.

David Gertler, *Automated Data Entry*, Seybold Report on Desktop Publishing, Jan. 15, 1990, pp. 3-17.

Eric Aas and Peter Davidoff, *Teaching Your Scanner to Read*, Personal Publishing, May 1990, pp. 28, 31, 33.

Phillip Robinson et al., *Character Witnesses*, MACUSER, Jul. 1990, pp. 120-136.

Brita Meng, *Text Without Typing*, MACWORLD, Oct. 1990, pp. 177-183.

Jim Heid, *Getting Started with Optical Character Recognition*, MACWORKD, Oct. 1990, pp. 297-301.

Stanford Diehl and Howard Eglowstein, *Tame the Paper Tiger*, BYTE, Apr. 1991, pp. 220-238.

Alan Joch and Rich Graham, *Voices of Experience*, BYTE, Apr. 1991, pp. 239-241.

Gregory Boleslavsky and Roman Tutunikov, *The New Generation of OCR*, INFORM, Jan. 1990, pp. 34-37.

Calera Recognition Systems, Inc., TopScan Professional User's Guide: Complete Document Recognition for PCs and Compatibles (1989).

Calera Recognition Systems, Inc., TopScan Professional Installation Notes for Scanners, Fax Cards, and System Configuration (1989).

Calera Recognition Systems, Inc., TopScan Professional Troubleshooting Guide (1989).

Xerox Imaging Systmes, Inc., Datacopy AccuText User's Guide (1989).

Invoice from Corporate Intelligence Corporation to Workman, Nydegger & Seeley, dated Sep. 21, 1999.

Examiner Interview Summary Record, Jan. 25, 1996, and related Amendment, for U.S. Appl. No. 08/097,131.

Jane B. Newman, Formstar Ad; "Stack the Facts, Not the Forms"—May 24, 1987; "Stack and Send Just the Facts—and Improve the Efficiency of your Forms Application".

TeleImage Systems Document and Image Database Systems User's Manual- Ramat Gan, Israel; Table of Contents and pp. 2-1 through 5-20.

Form Out! Programmer's Manual; TeleImage Systems, Ramat Gan Israel; published Feb. 1991 pp. I, II, III, IV, V, VI, VII; 1.1-6.29 and A.1-G.11.

IPLEXUS, "The Extended Data Processing Concept", Plexus Computers, Ltd., 1988.

Laserfiche United, Capabilities and Functional Specifications, 2002 Compulink Management Center, Inc.

The LaserFiche™ System, LF00007-LF00010, Copyright 1998 Compulink Management Center.

LaserFiche™, Integrated Document Imaging and Text Processing Systems, Compulink Management Center, Inc.

Compulink Management Center, Copyright 1989, LF-00006.

PC Week, Document-Archival System Combines DOS with CD ROM, LF00011-LF-00032.

LASERFICHE, Zone OR Plug-in, 2002 Compulink Management Center, Inc.

LASERFICHE, Efficient Integration, http://www.laserfiche.com/products/techadmin/integration.html, Jul. 2, 2004.

LASERFICHE, Inteator's Toolkit, Compulink Management Center, Inc. 2003.

LASERFICHE, LaserFiche Integration Express-GIS™, http://www.laserfiche.com/products/integrationexpress-gis.html, Jul. 2, 2004.

OCR Texiris, Texiris User's Guide, Version 2.1, Image Recognition Integrated systems S.A.

Texiris User's Guide, 13. Interfacing Data Base Management Systems.

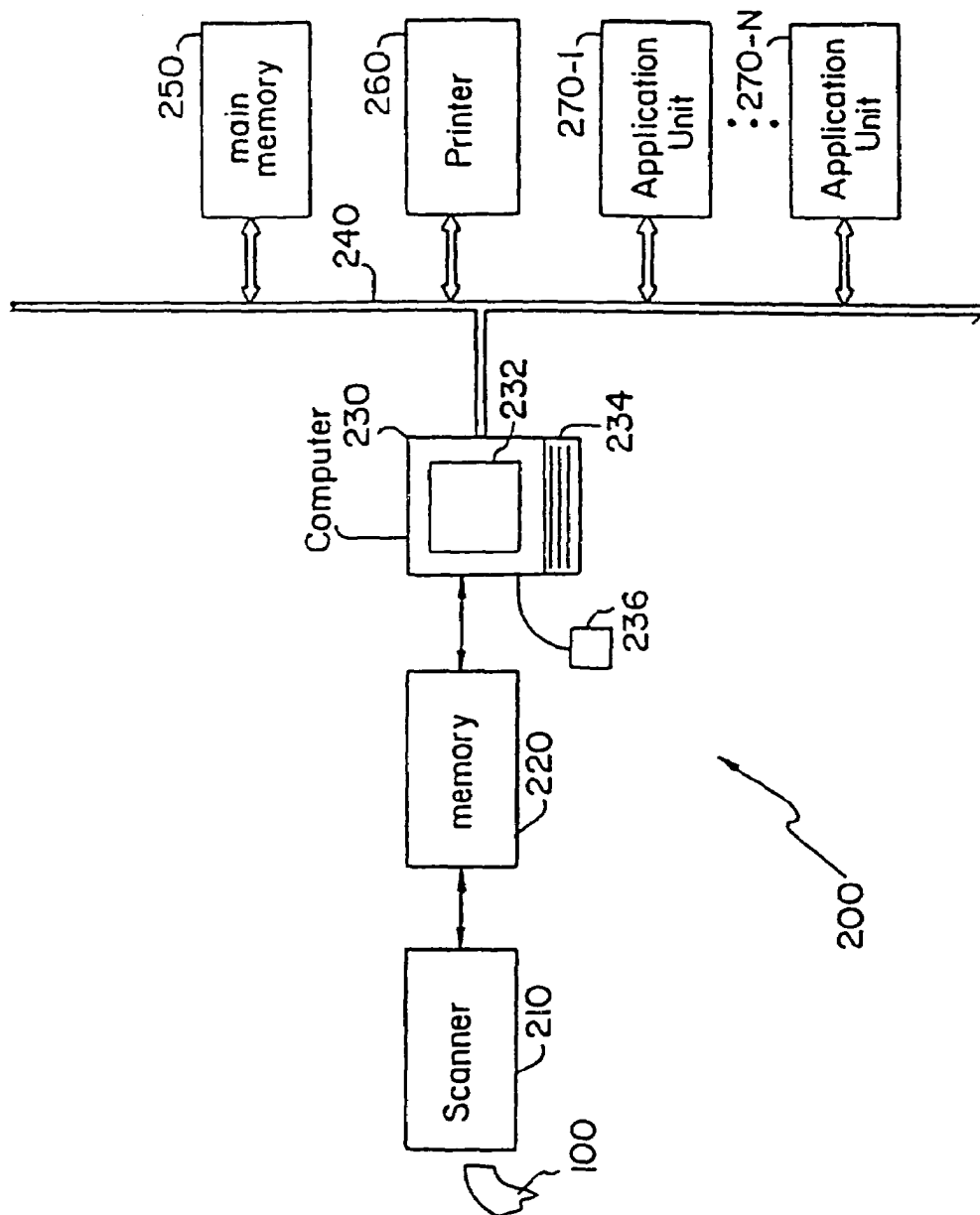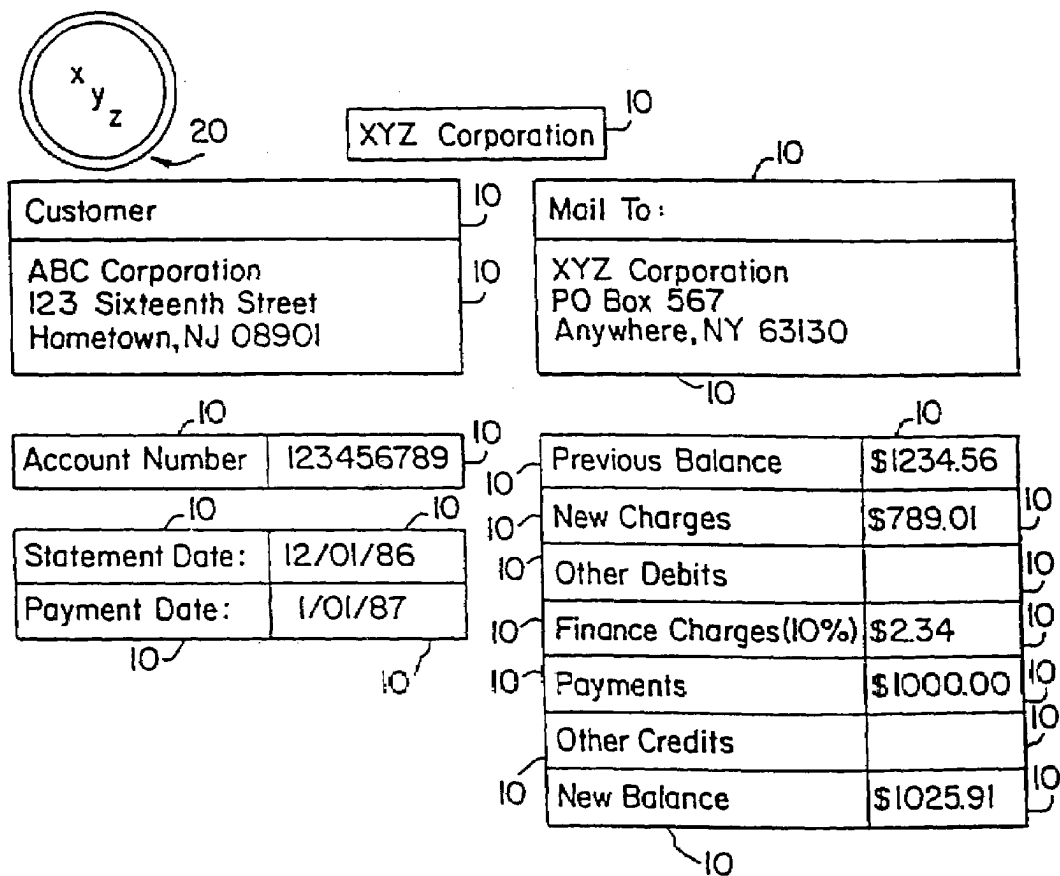Texiris User's Guide, 5. Correction Tools.

* cited by examiner

FIG. I

XYZ Corporation — 10

Customer	10
ABC Corporation 123 Sixteenth Street Hometown, NJ 08901	10

Mail To:	10
XYZ Corporation PO Box 567 Anywhere, NY 63130	10

Account Number	123456789

Statement Date:	12/01/86
Payment Date:	1/01/87

Previous Balance	$1234.56
New Charges	$789.01
Other Debits	
Finance Charges (10%)	$2.34
Payments	$1000.00
Other Credits	
New Balance	$1025.91

Winter Sale In Effect Throughout January !

30

FIG. 2
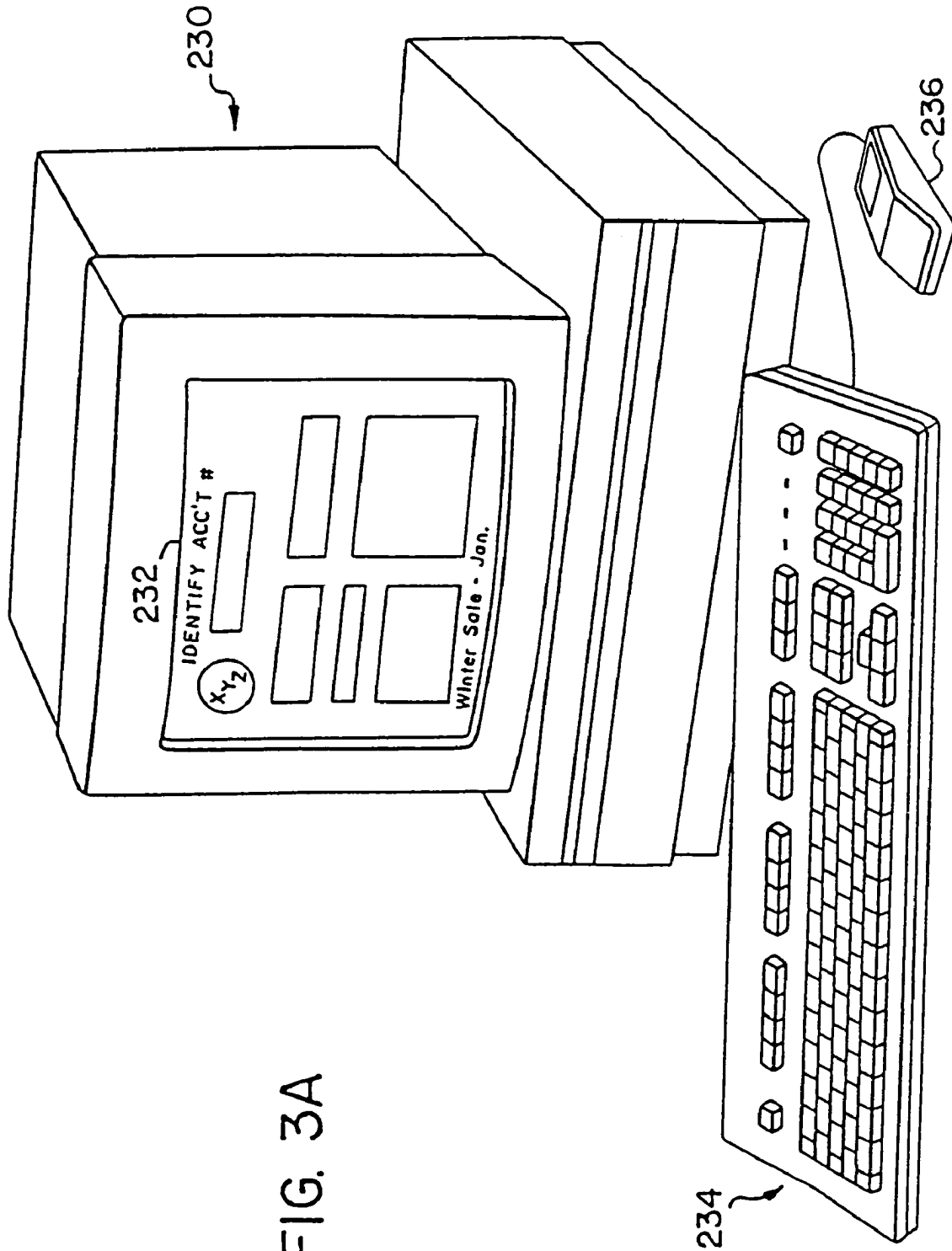
FIG. 3A

FIG. 3B

ACCOUNTS PAYABLE

VENDOR	
INVOICE #	
INVOICE DATE	
DATE DUE	
AMOUNT DUE	

232C

232A

XYZ CORPORATION

MAIL TO:	
XYZ CORPORATION	
PO BOX 567	
ANYWHERE, NY 63130	

PREVIOUS BALANCE	$1234.56
NEW CHARGES	$789.01
OTHER DEBITS	
FINANCE CHARGES 10%	$2.34
PAYMENTS	$1000.00
OTHER CREDITS	
NEW BALANCE	$1825.91

232R

CUSTOMER

XYZ

ABC CORPORATION
123 SIXTEENTH STREET
HOMETOWN, NJ 08901

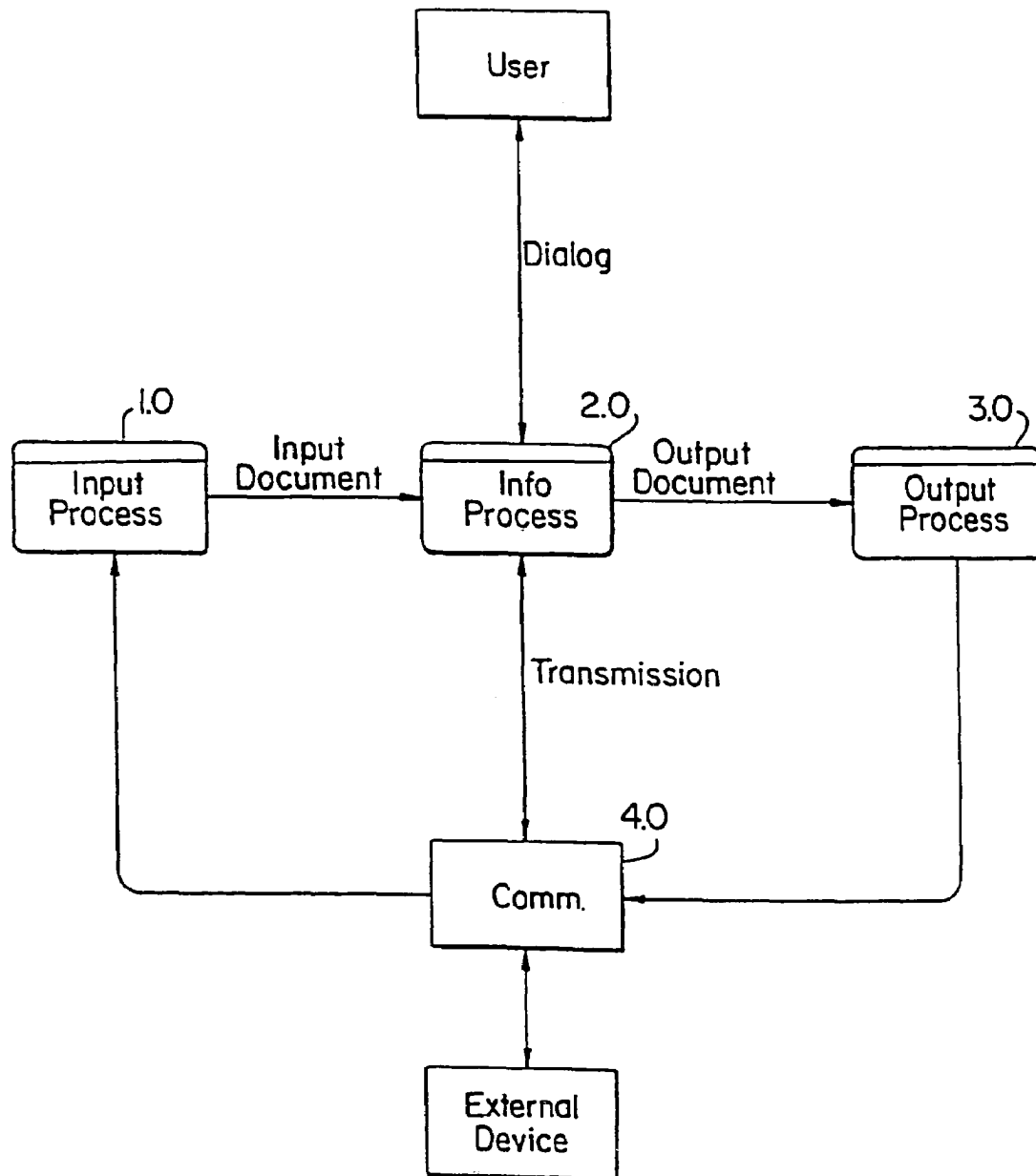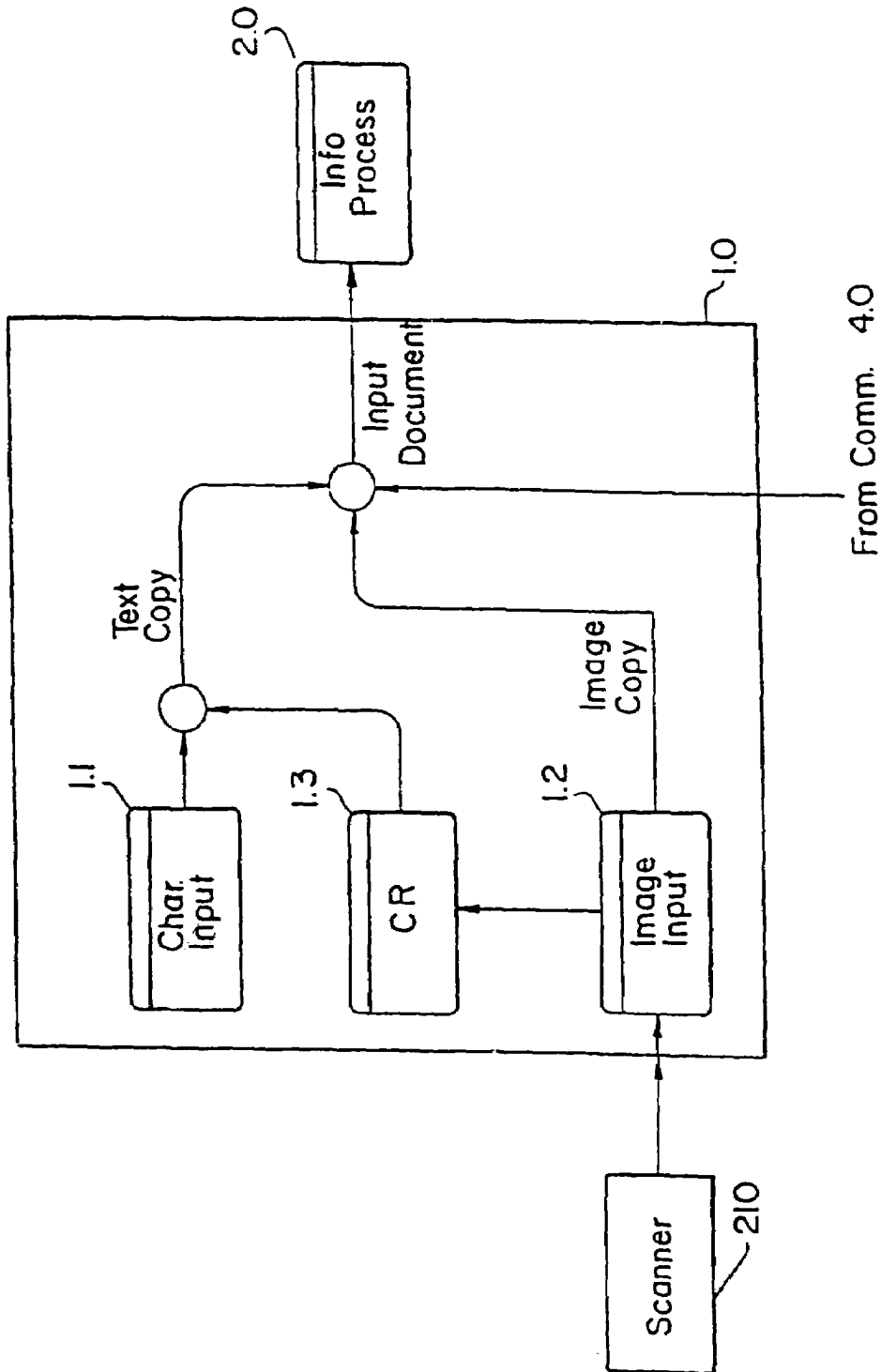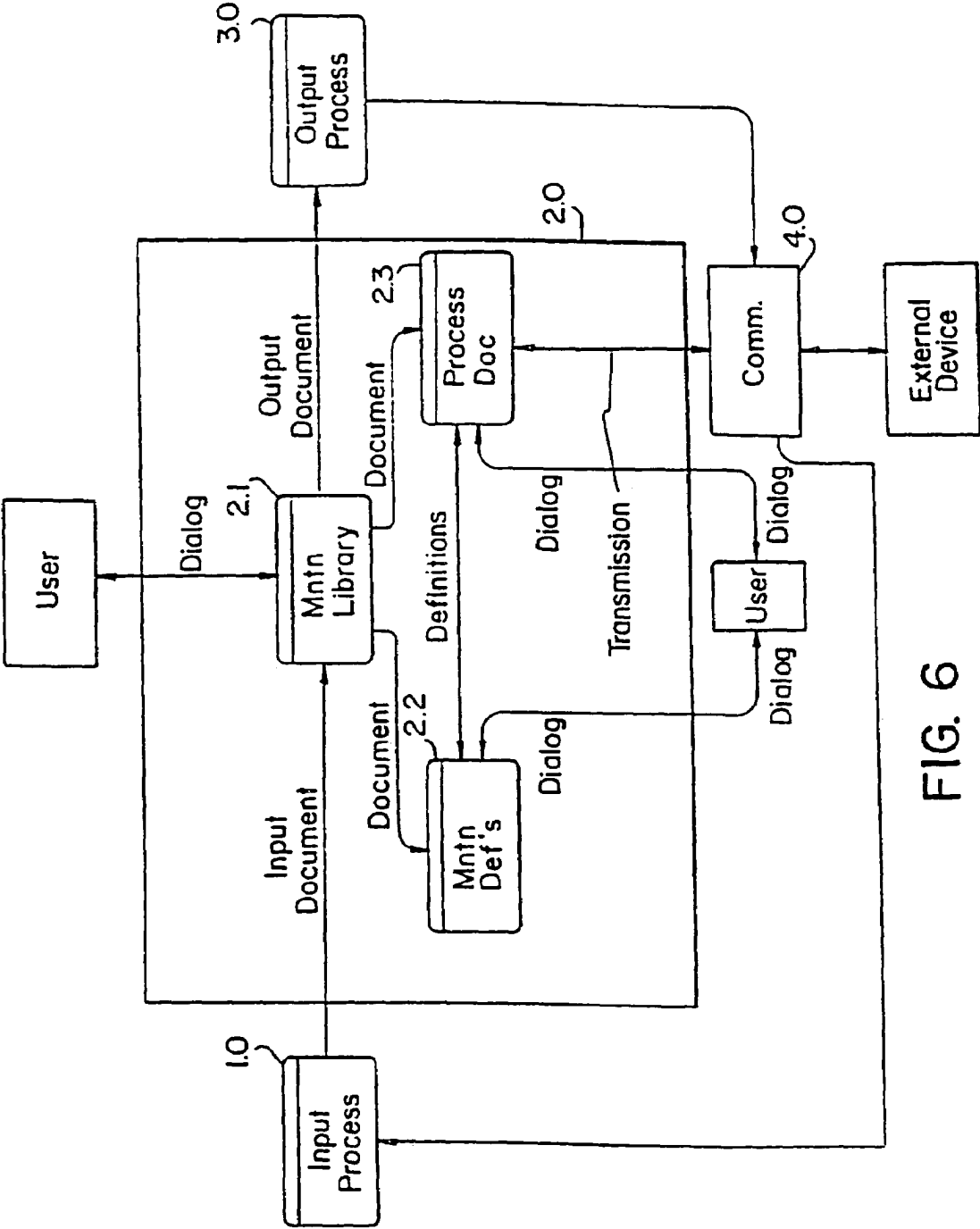| ACCOUNT NO.	123456789
STATEMENT DATE	12/01/87
PAYMENT DATE	1/01/87

WINTER SALE IN EFFECT
THROUGHOUT JANUARY !

232L

230

FIG. 4

FIG. 5

FIG. 6

FIG. 7

FIG. 8
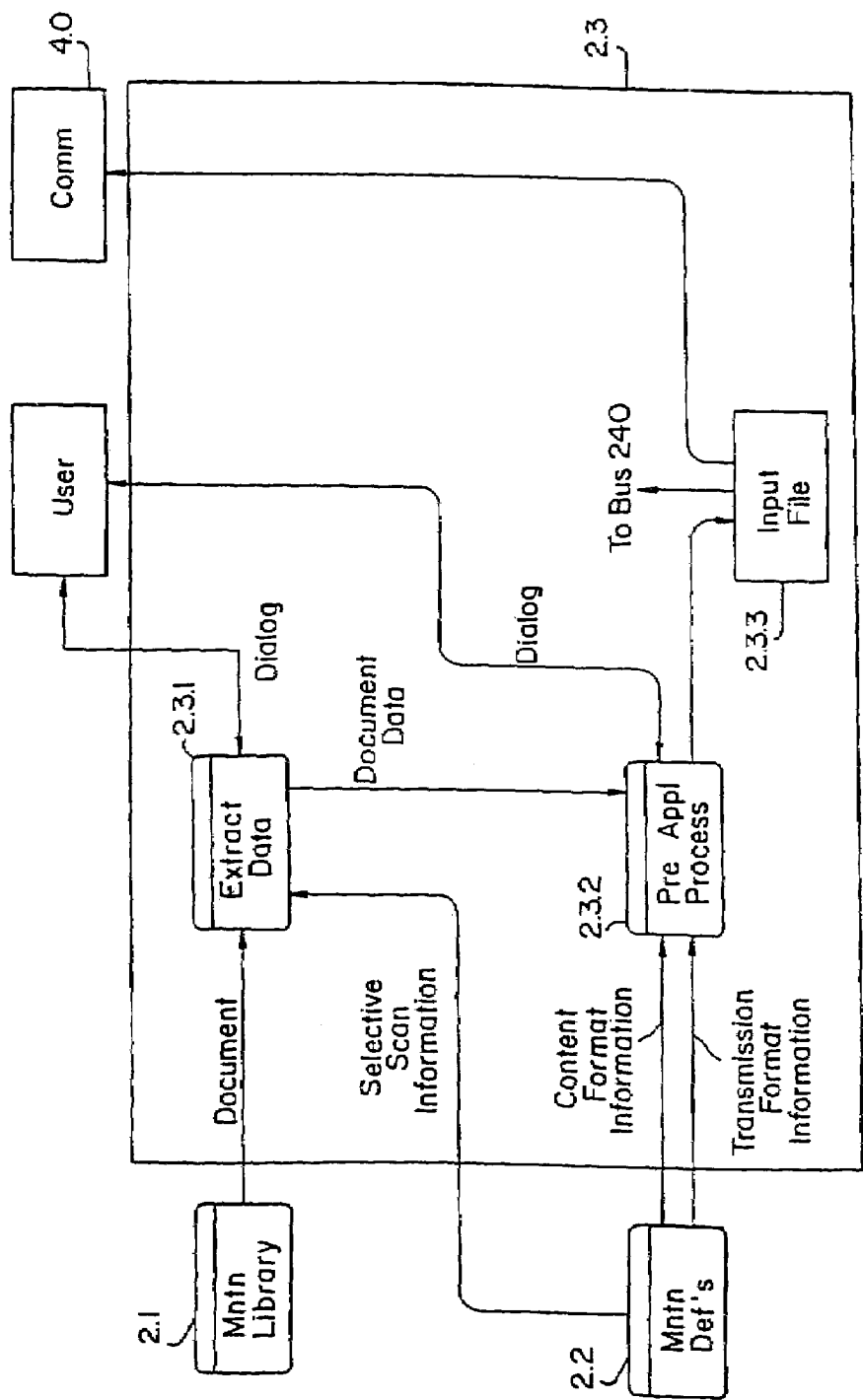
FIG. 9
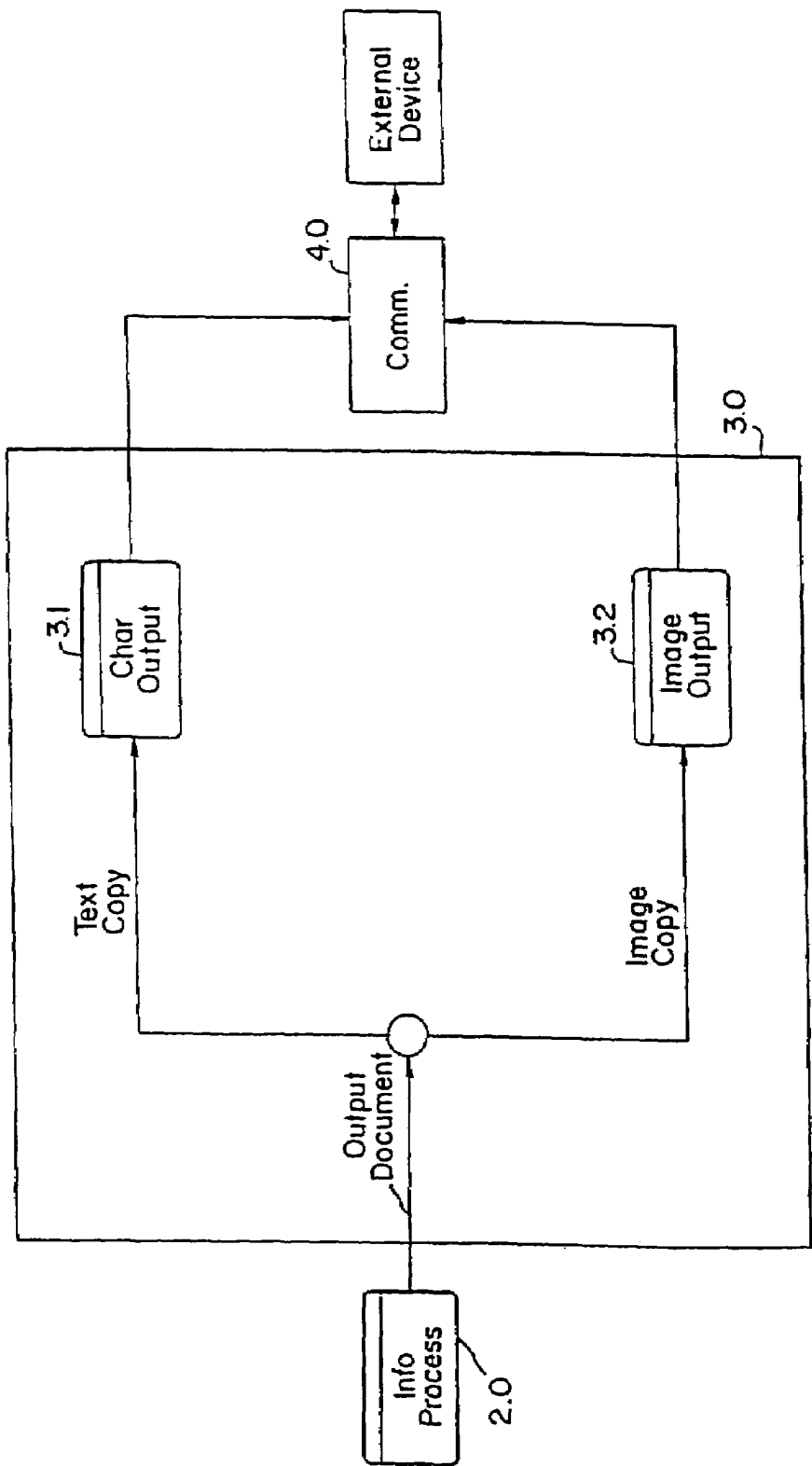
FIG. 10

FIG. 11

Variable Name	Value
Vendor	XYZ Corporation
Heading 2	2
Mail To	XYZ Corporation
	PO Box 567
	Anywhere, NY 63130
Account Number	123456789
Statement Date	12/01/86
Payment Date	1/01/87
Previous Balance	$1234.56
New Charges	$789.01
Debits	
Finance Charges	$2.34
Payments	$1000.00
Other Credits	
New Balance	$1025.91

FIG. 12A

Variable Name	Value
Vendor	XYZ Corporation
Account Number	123456789
Statement Date	12/01/86
Payment Date	1/01/87
Previous Balance	$1234.56
New Charges	$789.01
Debits	
Finance Charges	$2.34
Payments	$1000.00
New Balance	$1025.91

FIG. 12B

Variable Name	Value
Mail To	XYZ Corporation PO Box 567 Anywhere, NY 63130
Previous Balance	$1234.56

FIG. 12C
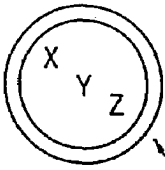
Variable Name	Value
Mail To	XYZ Corporation PO Box 567 Anywhere, NY 63130
Previous Balance	$1234.56

FIG.13A
```
> 1 > 1 >1 > "XYZ Corporation"
> 2 > 2 > 25 >+ 123456789 >
> 3 > 2 > 1 > D12 / 01 / 86 >
> 4 > 2 > 11 > D12 / 15 / 86 >
> 5 > 2 > 21 > D01 / 01 / 87 >
> 6 > 10 > 25 > $1234.56 >
> 7 > 11 > 25 > $789.01 >
> 8 > 13 > 25 > $2.34 >
> 9 > 14 > 25 > $1000.00 >
> 10 >16 > 25 > $1025.91 >
```

FIG.13B
```
> 1 > 1 >1 > $1234.56 >
> 2 > 2 > 1 > "XYZ Corporation"
> 3 > 3 > 1 > "PO Box 567"
> 4 > 4 > 1 > "Anywhere, NY  63130"
```

FIG.13C
```
/ 1 / 1 /1 / $1234.56 / /
/ 2 / 2 / 1 / *XYZ Corporation*
/ 3 / 3 / 1 / *PO Box 567*
/ 4 / 4 / 1 / *Anywhere, NY  63130*
```

FIG. 14

XYZ Corporation

~ 20

Customer

ABC Corporation
123 Sixteenth Street
Hometown, NJ 88981

Mail To:

△ XYZ Corporation
PO Box 567
Anywhere, NY 63130 △

Account Number   123456789

Previous Balance $1234.56

New Charges   □ $789.01 □

Statement Date: ○ 12/01/86 ○

Other Debits

Payment Date: 1/01/87

Finance Charges (10%) $2.34

Payments $1000.00

WINTER SALE IN EFFECT THROUGHOUT JANUARY:

Other Credits

30 ⌐

New Balance $1025.91

US 7,075,673 B2

1

INFORMATION PROCESSING METHODOLOGY

This application is a continuation of application Ser. No. 09/458,162, filed Dec. 9, 1999 now U.S. Pat. No. 6,683,697 which is a continuation of application Ser. No. 09/044,159, filed Mar. 19, 1998 (now U.S. Pat. No. 6,094,505), which is a continuation of application Ser. No. 08/487,150, filed Jun. 7, 1995 (now U.S. Pat. No. 5,768,416), which is a divisional of Ser. No. 08/348,224, filed Nov. 28, 1994 (now U.S. Pat. No. 5,625,465), which is a continuation of Ser. No. 08/143, 135, filed Oct. 29, 1993 (now U.S. Pat. No. 5,369,508), which is a continuation of Ser. No. 07/672,865, filed Mar. 20, 1991 (now U.S. Pat. No. 5,258,855).

BACKGROUND OF THE INVENTION

The invention is directed to a system for efficiently processing information originating from hard copy documents. More specifically, the invention is directed to a hard copy document to application program interface which minimizes the need to manually process hard copy documents.

In the past, information contained on hard copy documents was manually entered into a computer via the input controller of a particular computer. The original document was then filed away for future reference. Automatic input of data was limited to the input of Magnetic Ink Character Recognition (MICR) data and to Optical Character Recognition (OCR) data. This fixed-position data was forwarded directly to a dedicated computer application specifically designed to accommodate the input format. In more recent years typewritten text has been mechanically inputted into a computer via a text file. Examples of this latter type of system are word processors and photo-typesetters.

These conventional systems have limitations which decrease the efficiency of processing information from a hard copy document. For example, the systems discussed above are limited in their application to MICR, OCR, or typewritten data. Parsing and processing data is limited to the particular requirements of the particular computer application which requires the input data. In addition, in these conventional systems, the actual hard copy document must be retained for future reference at great expense.

In a sophisticated computer network, different users may require different portions of the information contained on a hard copy document. For example, if the hard copy document is an invoice returned with payment of a bill, the accounting department may need all of the monetary information contained on the bill while the mailroom may need only customer address information, to update a customer's address. Therefore, there is a need for a system in which specific information from a hard copy document can be selectively distributed to various users.

Another problem with conventional systems is that users, even within the same company, may require that the information extracted from a hard copy document be transmitted to a particular application program in a specific transmission format. For example, one department in a company may use a particular application program which must receive information using a particular character as a delimiter and other departments may require the information in a different format using different delimiters.

Another problem, particularly for small businesses, is that current systems can not efficiently accommodate the inputting of information from a diversity of hard copy documents. A large business which receives many forms in the same

2

format can afford a system which inputs a high volume of information in that format into memory. For example, it is cost-effective for a bank which processes hundreds of thousands of checks a month to buy a dedicated machine which can read information off of checks having a rigidly defined, or fixed, format. However, as the diversity of forms received by a business increases relative to the number of forms that must be processed, it becomes less cost-effective to design a dedicated machine for processing each type of form format. This problem is particularly significant in small businesses which may, for example, receive fifty invoices a month, all in different, non-fixed, formats. It is frequently not cost-effective for a small business to design dedicated systems for inputting information in each of these various formats. This leaves a small business with no other practical alternative than to manually input the information off of each invoice each month.

SUMMARY OF THE INVENTION

It is an object of the invention, therefore, to provide an application program interface which allows a user to select specific portions of information extracted from a diversity of hard copy documents and allows the user to direct portions of this information to several different users in accordance with the needs of the particular user.

It is also an object of the invention to provide a cost-effective system for inputting hard copy documents which can accommodate hard copy documents in a diversity of formats.

It is another object of the invention to provide an application program interface which allows a user to put information, which is to be transmitted, into a particular transmission format, based upon the needs of the receiver of the information.

It is a further object of the invention to provide an application program interface which will allow the extraction, selection, formatting, routing, and storage of information from a hard copy document in a comprehensive manner such that the hard copy document itself need not be retained.

It is another object of the invention to provide a system which reduces the amount of manual labor required to process information originating from a hard copy document.

A further object of the invention is to reduce the time required to process information originating from a hard copy document so that a higher volume of transactions involving hard copy documents can be processed.

The invention provides an application program interface which inputs a diversity of hard copy documents using an automated digitizing unit and which stores information from the hard copy documents in a memory as stored document information. Portions of the stored document information are selected in accordance with content instructions which define portions of the stored document information required by a particular application unit. Selected stored document information is then formatted into the transmission format used by the particular application program based on transmission format instructions. The transmission formatted selected stored document information is then transmitted to the particular application program. The hard copy documents may contain textual information or image information or both.

The interface operates in three different modes.

In a first mode, the interface extracts all of the information from hard copy documents and stores this information in memory. Parsing of various portions of the extracted information is performed in accordance with content instructions.

US 7,075,673 B2

<table>
<tr><td>3</td><td>4</td></tr>
</table>

In a second mode, the user operates interactively with the interface by use of a display and an input device, such as a mouse. In this second mode, a hard copy document is inputted and displayed on the display. The interface then prompts the user to identify the location of various information. For example, the interface can ask the user to identify the location or address information on the hard copy document. In response, the user positions the mouse to identify address information using a cursor. The identified information is then stored as address information in memory. Subsequently, the interface again prompts the user to identify other pieces of information, which are then stored in the appropriate locations in memory. This process proceeds until all of the information which is desired to be extracted off of the hard copy document is stored in memory.

In a third mode of operation, selected portions of information are extracted off of hard copy documents in accordance with predetermined location information which has been specified by the user. For example, the user can define a template which specifies the location of information on hard copy documents. Templates can be formed in conjunction with second mode operation. Alternatively, the user can instruct the interface to search hard copy documents for a particular character or symbol, located on the hard copy documents. The information desired to be extracted off of the hard copy documents is specified relative to the location of this character or symbol.

The interface can also prompt or receive from an applications program or another information processing system, required information, content instructions, and format instructions.

Other objects, features, and advantages of the invention will be apparent from the following detailed description of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in further detail below with reference to the accompanying drawings, in which:

FIG. 1 illustrates hardware for implementing a preferred embodiment of the instant invention;

FIG. 2 illustrates an example of a hard copy document containing information to be processed by the instant invention;

FIGS. 3A and 3B are enlarged views of the computer of FIG. 1 used to explain how the invention interactively prompts a user to identify information;

FIG. 4 is an overall data flow diagram for the FIG. 1 preferred embodiment;

FIG. 5 is a detailed input data flow diagram for the FIG. 1 preferred embodiment;

FIG. 6 is a detailed information processing data flow diagram for the FIG. 1 preferred embodiment;

FIG. 7 is a more detailed information processing data flow diagram for the maintain library module of FIG. 6;

FIG. 8 is a more detailed information processing data flow diagram for the maintain definitions module of FIG. 6;

FIG. 9 is a more detailed information processing data flow diagram for the process document module of FIG. 6;

FIG. 10 is a detailed output data flow diagram for the FIG. 1 preferred embodiment;

FIG. 11 lists data corresponding to the hard copy document of FIG. 2;

FIGS. 12A, 12B, and 12C illustrate examples of data which can be selected from the extracted data of FIG. 11 in accordance with content instructions;

FIGS. 13A, 13B, and 13C illustrate examples of the data of FIGS. 12A, 12B, and 12C formatted in accordance with various transmission format instructions to form input files; and

FIG. 14 illustrates another example of a hard copy document containing information to be processed by the instant invention.

DETAILED DESCRIPTION OF THE
PREFERRED EMBODIMENTS

Hardware

The invention provides an interface between information originating from a hard copy document and a computer application unit which uses the information. The computer application unit can be a particular computer application program or a device which is controlled in accordance with instructions or information from the hard copy document. The invention also allows storing a copy of the hard copy document in a memory and retrieving the copy of the hard copy document. By providing a comprehensive and integrated system which can accommodate almost all of the possible uses of information contained on a hard copy document, the instant invention allows for a paperless office.

The invention includes hardware and software necessary to extract, retrieve, and process information from the hard copy document. A copy of the actual image of the hard copy document is stored in memory. Textual information extracted from the hard copy document is also stored in memory. Textual information is information, such as alphanumeric characters, which is recognized on the hard copy document and which is stored in a form which corresponds to the particular recognized character. For example, the extracted characters can be stored in the ASCII format in an electronic memory.

The user can have all of the information extracted from the hard copy document and stored in memory. Alternatively, the interface can interactively prompt the user to identify specific pieces of information for storage. The interface can also extract specific pieces of information using a predefined template. The interface can also prompt or receive from another information processing system or an applications program desired information, content instructions, and format instructions.

The instant invention also provides for parsing information extracted from the hard copy document and for directing this parsed information to specific users or application programs as an input file.

The invention also permits the user to define the transmission format of the input file for a particular computer application unit.

FIG. 1 illustrates hardware for implementing a preferred embodiment of a hard copy document to application program interface according to the instant invention. The interface 200 processes information extracted off of hard copy document 100 and provides information to application units 270 in a form required by each particular application unit. The interface extracts information off of a hard copy document 100 utilizing a scanner 210. The scanner 210 can be any type of scanner which extracts information off of hard copy documents, for example, an Optical Reader.

The scanned information is stored in a scanner memory 220 or in main memory 250, as will be described in greater detail below. If main memory 250 or another memory is, available to store the scanned information, then scanner memory 220 can be omitted.

US 7,075,673 B2

5

The information from scanner memory **220** or main memory **250** is transmitted to computer **230**. In the preferred embodiment, computer **230** includes a display **232**, a keyboard **234**, and a mouse **236**. The display **232** displays an image of the hard copy document itself and/or information necessary to process the information extracted off of the hard copy document.

The computer **230** is used to select portions of the stored document information contained in memory in accordance with content instructions which define portions of the stored document information required by an application unit. These content instructions may be provided by the application program. Alternatively, the content instructions can be inputted via an input device such as a keyboard, a touch screen, a mouse, a notepad, a voice recognition device, or the like.

The computer **230** is also used to format selected stored document information into the transmission format used by an application unit based on transmission format instructions. The transmission format instructions may be provided by the application program. Alternatively, the transmission format instructions can be inputted via a keyboard, a touch screen, a mouse, a notepad, a voice recognition device, or the like.

Thus, the computer **230** is used to generate an input file for a particular application unit. The computer **230** is connected to scanner memory **220**, main, or permanent, memory **250**, a printer **260**, and application units **270**, via a bus **240**. Although FIG. **1** illustrates use of a bus to connect components together, it is understood that any routing or connecting link, implemented in hardware or software or both, can be employed instead of, or in addition to, a bus. Instructions to or in the computer **230** control the main memory **250**, the printer **260**, the application units **270**, and the bus **240**. Instructions to or in computer **230** can also control exchanges of information with scanner memory **220**.

When the computer **230** generates an input file for a particular document, the computer **230** can send this input file directly to an application unit or can store this input file in the main memory **250** until required by an application unit. The main memory **250** may also optionally store a copy of the image information for the hard copy document and the textual information for the hard copy document. Thus, the image information and textual information from the hard copy document can be retrieved and printed out on printer **260**. In addition, image and textual information stored in scanner memory **220** or in main memory **250** can be used to form additional input files at the time of input or at a later time, based on content instructions and transmission format instructions. Thus, the invention can, at the discretion of the user, eliminate the need to retain copies of hard copy documents, permitting a paperless office.

The application units **270** include particular application programs and devices which are controlled in accordance with information contained on hard copy document **100**.

FIG. **2** illustrates an example of a hard copy document **100** which contains information to be processed by the instant invention. The document illustrated in FIG. **2** is a bill from XYZ Corporation to customer ABC Corporation. FIG. **2** is only an example of a type of document that can be processed by the instant invention.

In a first operational mode, the scanner **210** stores all of the information extracted off of hard copy document **100** in the scanner memory **220** or, alternatively, in main memory **250**. The extracted information is stored in two forms. The actual image of the hard copy document **100** is stored as image information in the scanner memory **220**. In addition, the scanner memory **220** stores textual information recog-

6

nized on the hard copy document **100** by, for example, employing standard character recognition software. In the preferred embodiment, the textual information is stored in ASCII format. The scanner memory **220** can be, for example, an electronic, magnetic, or optical memory.

FIG. **3A** illustrates an enlarged view of the computer **230** of FIG. **1**. This view will be used to describe a second mode of operation. In this second mode of operation, the hard copy document **100** is scanned and a copy of the document **100** is displayed on display **232** of computer **230**, based on the contents of information temporarily stored in scanner memory **220**. After the document is displayed on display **232**, the computer **230** interactively prompts the user to identify the location of specific pieces of information on the hard copy document. In the FIG. **3A** illustration, this prompt message is indicated as the message beginning with the arrow.

For example, the prompt message can ask the user to identify the location of account number information on the hard copy document. The user then uses an input device, such as keyboard **234** or mouse **236** or a touch screen, notepad, voice recognition device, or other input device to position a cursor on the display to identify the location of the information requested by the prompt message. For example, the cursor could be used to define a block (which could be highlighted) containing the requested information, followed by a mouse "enter" click. In this example, the user would move the mouse to identify the location of the account number information contained on the hard copy document **100**. The computer **230** then stores the information which has been identified by the user as account number information in the appropriate address or subfile or as the appropriate variable or parameter in memory. The computer then prompts the user to identify the location of other information on the hard copy document, such as, statement date information. The process proceeds until all of the desired information has been stored into the appropriate locations in memory.

FIG. **3B** illustrates a variation of the second mode for interactively prompting the user for information. In FIG. **3B**, the display is split into two portions. A left-hand portion **232L** displays the image of the hard copy document and a right-hand portion **232R** displays the required application program information. For example, in FIG. **3B**, portion **232R** displays a spreadsheet used by an application program. While observing the split display, the user can input instructions to associate specific pieces of information on the hard copy document (for example, the vendor name indicated by the mouse arrow **232A**) with particular subfiles in memory (for example, the vendor field next to which the cursor **232C** appears), using a mouse or other input device(s) or both. The split display also allows the user to generate content format instructions while observing the information required for a particular application program on the right-hand portion.

These second modes of operation are efficient for small businesses which receive a small number of a wide variety of invoices, since the user does not necessarily have to store all of the information that appears on the hard copy document. A further advantage is that data input is quicker, easier, and more accurate than with previous keyboard methodology. In addition, by specifying the location on the hard copy document of information, the user may optionally create a template, to be described in further detail below, for each different type of invoice. This template is stored for future use when another hard copy document in the same format is received.

US 7,075,673 B2

7

More specifically, instructions from computer **230** can direct the scanner **210** and scanner memory **220**, and/or main memory **250**, to scan and/or store only specific portions of hard copy document **100**. After the interactive prompts required to obtain information for a desired application program, the unused information stored in scanner memory **220** or **250** can be erased. Further, scanning of a second identical document can be limited to only those portions of the document which contain needed information.

More specifically, in FIG. **2**, the lines **10** drawn around certain portions of the document represent the areas which the user has previously identified as the portions of a document to be extracted by the scanner **210** and stored in scanner memory **220** and/or main memory **250**. Since the logo **20** and the message **30** have not been identified as an area to be scanned and stored, these areas are not scanned and stored in subsequent documents. Since the user has previously associated each of the areas **10** with a specific subfile of information, e.g., the account number, the scanned information is stored in memory locations corresponding to that subfile.

Data Processing

FIGS. **4–10** illustrate the flow of data in the FIG. **1** preferred embodiment. FIG. **4** illustrates the overall data flow for the FIG. **1** preferred embodiment. The preferred embodiment includes an input process module **1.0**, an information processing module **2.0**, and an output processing module **3.0**. The information processing module **2.0** is equipped to receive instructions from and transmit information to a user. The information processing module **2.0** can also transmit to and receive information from a remote external device through communication interface **4.0**. Input process module **1.0** and output processing module **3.0** can also access communication interface **4.0**. A module is implemented in hardware, software, or a combination of hardware and software. The specific implementation for a particular business application depends upon a variety of factors, for example, the relative costs of hardware and software implemented systems, the frequency with which a user will want to expand or modify the system, and the like.

FIG. **5** is a more detailed diagram of the input process module **1.0** of FIG. **4**. The input process module **1.0** includes a character input module **1.1**, an image input module **1.2**, and, in the preferred embodiment, a character recognition device **1.3**. The character input module inputs textual information, such as alphanumeric characters, from an input device such as keyboard **234**. The image input module **1.2** inputs image information, for example, a digitized image of the actual appearance of hard copy document **100**. Textual information can include textual input from an input device such as keyboard **234** and textual information extracted from the document by character recognition device **1.3**. Both types of information comprise an input document which is transmitted to information processing module **2.0**. In the FIG. **1** preferred embodiment, the processing performed by input process module **1.0** occurs in scanner memory **220**, computer **230**, and main memory **250**.

FIG. **6** illustrates information processing data flow for the FIG. **1** preferred embodiment, that is, FIG. **6** illustrates data flow in the information processing module **2.0**.

The information processing module **2.0** includes a maintain library module **2.1**, to be described in further detail below in conjunction with FIG. **7**, a maintain definitions module **2.2**, to be described in further detail below in

8

conjunction with FIG. **8**, and a process document module **2.3** to be described in further detail below in conjunction with FIG. **9**.

The information processing module **2.0** is the module which coordinates and drives the entire system. In the preferred embodiment, the information processing module **2.0** is implemented primarily by computer **230**.

FIG. **7** illustrates information processing data flow in the maintain library module **2.1**. The maintain library module **2.1** maintains a library of image information, for example, a digitized image representing the actual appearance of the hard copy document, and textual information of the hard copy documents for reference during processing. This library can be incorporated within scanner memory **220**, main memory **250**, or another independent memory, for example, a RAM disk. The maintain library module **2.1** includes a store document module **2.1.1**, a correct errors module **2.1.2.**, a retrieve document module **2.1.3**, and a document file **2.1.4**. These modules operate collectively to store, retrieve, and correct document information.

The store document module **2.1.1**, prior to routing the document to the document file **2.1.4**, may provide information on recognition errors which may have occurred while inputting the document. For example, the store document module **2.1.1** identifies that a character contained oh hard copy document **100** was not recognized. The store document module **2.1.1** also optionally causes a copy of the document and its parsing to be displayed on the display **232** for confirmation by the user. The user may utilize this opportunity to identify any errors in the displayed document and, in conjunction with the correct errors module **2.1.2**, to revise the document's parsing, if necessary, prior to storage of the document in memory. The module **2.1.1** also provides a facility for the user to name a particular hard copy document for cataloging, storage, and retrieval purposes. After the document is named, the store document module **2.1.1** stores copies of the document in the document file **2.1.4**.

The correct errors module **2.1.2** processes instructions from the user to correct errors identified by thee store document module **2.1.1** and errors that have been spotted by the user during the confirmation process.

The retrieve document module **2.1.3** permits the user to retrieve a copy of a document previously stored in the document file **2.1.4**. As described above, long-term storage is provided by main memory **250**, if necessary.

FIG. **8** illustrates a more detailed information processing data flow diagram for the maintain definitions module **2.2** of FIG. **6**. The maintain definitions module **2.2** allows the user to define system and document parameters and maintains the definitions of these system and document parameters. The maintain definitions module **2.2** includes a define template module **2.2.1** which allows the user to specify the location of information on the document. This information provided by the user defines a template which is used to extract information off the document and to associate the extracted information with a particular variable or subfile. These templates are illustrated by boxes **10** in the FIG. **2** example of a hard copy document. The maintain definitions module **2.2** can also access templates previously defined by the user and stored in main memory **250**. Templates can also be provided as part of software packages developed by program developers.

The maintain definitions module **2.2** also includes a define relationships module **2.2.2**. The define relationships module **2.2.2** allows the user to define data relationships, or logical relationships, between pieces of information extracted from the hard copy documents. These pieces of information are

US 7,075,673 B2

9

then used to generate an input file for a selected computer application unit. The user defines these relationships by content instructions. Alternatively, content instructions to define relationships can be provided by application software. If the user provides these content instructions, the content instructions are inputted via keyboard **234** or via another input device such as a notepad, a voice recognition device, or the like. Examples of content instructions, data, and logical relationships will be described in further detail in conjunction with FIGS. **11** and **12**A, **12**B, and **12**C.

The maintain definitions module **2.2** also includes a define format module **2.2.3**. The define format module **2.2.3** allows the user to define transmission formats for an input file which is then transmitted to a selected computer application unit. Selection of the transmission format of the input file is accomplished by the user through use of transmission format instructions. Alternatively, the applications software itself can generate its own transmission format instructions. When the user must specify transmission format instructions, the transmission format instructions are inputted via keyboard **234** or via another input device such as a notepad, a voice recognition device, or the like. A further description of various transmission formats will be provided below in conjunction with FIGS. **12**A, **12**B, **12**C, **13**A, **13**B, and **13**C.

A select definitions module **2.2.4** is also included in the maintain definitions module **2.2**. The select definitions module **2.2.4** allows the user to store and select a set of definitions to be used for processing the document. The definitions identify pieces of information on the document by, for example, absolute location, variable location, or relative location, or by proximity to key words and/or symbols. These definitions are described in further detail below by way of an illustrative example.

FIG. **9** illustrates a more detailed information processing data flow diagram for the process document module **2.3**. The process document module **2.3** processes the document after the document has been stored in the system. The process document module **2.3** gathers the appropriate information which has been stored, and creates input file(s) **2.3.3** for the selected application unit. The process document module **2.3** then transmits the input file(s) via bus **240** and/or communication interface **4.0** to an application unit **270**, an output device such as printer **260**, or to main memory **250**.

The process document module **2.3** includes an extract data module **2.3.1**. This module extracts data off of the document in accordance with the user's instructions, for example, the user-defined template, or through the interactive mode.

The process document module **2.3** also includes a preapplication process module **2.3.2** which gathers and associates information extracted from the document in accordance with content instructions. This module prompts the user for any additional information required to satisfy the relationships defined by the content instructions. The preapplication process module **2.3.2** also places the selected information into the transmission format defined by the transmission format instructions.

The preapplication process module **2.3.2** also generates the input file **2.3.3** for the selected application in accordance with the appropriate instructions. The input file **2.3.3** is then transmitted to bus **240** and/or communication interface **4.0** for transmission to a particular application unit **270**.

FIG. **10** illustrates a detailed output data flow diagram for output module **3.0**. Output module **3.0** outputs a textual and/or image copy of the document. In the FIG. **1** preferred embodiment, output module **3.0** is implemented by printer **260**, associated software, and associated interface circuitry.

10

Operation

Examples of operation of a preferred embodiment will now be described.

The user enters the system by providing instructions to the information processing module **2.0**. The user then instructs the information processing module **2.0** to conduct maintain library processing, maintain definitions processing, or process document processing.

If the user selects maintain library processing, the user then provides instructions to maintain or modify the document library through the maintain library module **2.1**. For example, the user can direct the inputting and storage of a hard copy document **100** or can retrieve and output a document. The user requests inputting of a document through the store document module **2.1.1**. The system then prompts the user to specify a storage location for the inputted document. The document is then read-in by the input process module **1.0**. A textual copy and/or an image copy are stored into the document file **2.1.4**. Errors which have occurred during inputting are identified and corrected by the correct errors module **2.1.2** and the user. The corrections are reflected in the document information stored in document file **2.1.4**.

The retrieve document module **2.1.3** is used to retrieve and output a document. The system prompts the user to specify the storage location of a document and the type of document copy, for example, a textual or an image copy, to be outputted. The document is then outputted by the output process module **3.0**.

If the user initially selected maintain definitions processing, the user would instruct the system to maintain and/or modify parameter definitions through the maintain definitions module **2.2**. For example, the user can define and maintain a document template for extracting selected portions of information off of the hard copy document. The user can use the template to extract selected portions of information off of the hard copy document when the document is originally inputted, or alternatively, the user can use the template to identify selected portions of information for extraction off of an image copy of the document. In creating the template, the user identifies pieces of information on the document to be extracted and assigns a variable name, or subfile, to each piece of data.

The location of data to be extracted can be defined in a number of ways other than by use of a template. For example, the user can designate the absolute location of information on the document with respect to a grid overlaid on the document, e.g., always on line **3**, starting in column **1**. The user can also identify information by specifying the relative location of information to be extracted, e.g., always two lines below the piece of data named "salutation", starting in column **3**. The user can also specify the location of information to be extracted by variable location specification. For example, if the hard copy document is a letter, the module would conduct a key word search for the term "Dear Sir:". Wherever this term "Dear Sir:" is located, this piece of data would be associated with the variable specified by the user, for example, the variable "salutation." In addition, a defined set of conventional symbols can be used to signify certain recurring data items for the convenience of users of the instant invention. For example, a "@" symbol can be used to delineate the vendor name as follows: "@XYZ Corporation@". Other examples of the use of symbols to delineate information will be described with reference to FIG. **14**.

US 7,075,673 B2

11

The maintains definition module **2.2** is also used to maintain data relationships in accordance with content instructions and to maintain input file formats in accordance with transmission format instructions. Relationships are defined and maintained between pieces of data, specified by, for example, the names of variables, through the define relationships module **2.2.2**. The names of pieces of data on the document are retrieved by, for example, the define template module **2.2.1**, and are passed to the define relationships module **2.2.2**. The user may then provide any additional pieces of data needed to generate an input file for a particular application program or unit, such as an input file line number. The user, the applications software, and/or instructions previously stored in memory then establishes the contents of the input file by defining relationships between pieces of data using content instructions. Specific examples of content instructions will be discussed below in conjunction with FIGS. **11**, **12**A, **12**B, **12**C, **13**A, **13**B, and **13**C.

The user and/or the applications software defines and maintains the transmission format of the input file to be used by a particular application program or unit through the define format module **2.2.3** in accordance with transmission format instructions. This is accomplished by defining the parameters to be used by the preapplication process module **2.3.2** in generating an input file. Parameters which would typically be required to generate an input file would include the character type, e.g., text or pixel; delimiters used between pieces of data, e.g., a slash or a semicolon; end of line characters, e.g., a carriage return or a line feed; and end of file characters. Examples of transmission formats will be described in further detail below in conjunction with FIGS. **11**, **12**A, **12**B, **12**C, **13**A, **13**B, and **13**C.

If the user initially selected process document processing, the interface will then proceed to process the document through use of the process document module **2.3**. For example, the user can extract specific portions of data from an image copy of a document, can generate an input file for transmission to an application program, or can directly process information interactively with an application program.

If the user desires to extract specific portions of data from an image copy of a hard copy document which has already been stored in memory, is the user uses the extract data module **2.3.1** to identify a document to be processed. The document is then retrieved by the retrieve document module **2.1.3** and passed to the extract data module **2.3.1**. The user can also select parameter definitions through the select definitions module **2.2.4**.

The selected document template or parameter definition is passed to the extract data module **2.3.1**. The extract data module **2.3.1** extracts pieces of data from the image copy of the document, as defined by the document template definition or the parameter definitions or both. This document data is then passed to preapplication process module **2.3.2**.

The interface generates input file(s) **2.3.3** by use of the preapplication process module **2.3.2**. The selected data relationship definition, as defined by the content instructions, and the selected record format definitions, as defined by the transmission format instructions, are passed to the preapplication process module **2.3.2**. The preapplication process module **2.3.2** assembles the input file in accordance with the content instructions. The preapplication process module **2.3.2** also prompts the user for any additional pieces of data which need to be provided by the user. The input file is converted to the desired transmission format in accordance

12

with the transmission format instructions. This physically formatted data is then stored in the input file **2.3.3**.

The user can also use an application program to process information by loading the particular application program into the computer **230** rather than by sending the input file to a remote application unit **270**.

An illustrative example of the processing described above will now be described.

The user inputs instructions via keyboard **234** or another input device which indicate that the user desires to input and store a document. The computer **230** then prompts the user for the name of the document. In this example, the user desires to input the document of FIG. **2** and therefore names the document "XYZ Corp. Bill 12/01/86." The computer then prompts the user to feed the hard copy document **100** into the scanner **210**. The image of the hard copy document is displayed on display **232**. The computer then prompts the user to identify the account number on the document. By use of the mouse **236** or other input device to position a cursor on the display, the user indicates the location of the account number. The account number is then read-in to a subfile named "Account Number." This process proceeds until all of the desired information has been read-in and stored.

In this particular example, no errors were encountered while inputting the document. The user then directs that the document be stored for future reference in a document file.

Some time later, the user desires to retrieve and output the document and to generate input files based on information from the document. The computer **230** prompts the user for the name of the document and the type of output. The user responds with "XYZ Corp. Bill 12/01/86" for a printed textual copy. The document is then retrieved from the document file and passed to the printer **260** for printing.

In order to generate an input file for a specific application program, the user selects the option to define a document template for use when each month's XYZ Corporation bill arrives. Accordingly, the user instructs the system to display a copy of an XYZ Corporation bill on the display **232**. The user then identifies pieces of data by absolute locations. That is, the user assigns specific names to information located at specific portions of the document. In this example, the user would input the following information:

Vendor-text, line **1**, one line, column **1**, 80 characters;

Account number-numeric, line **6**, one line, column **25**, 9 characters;

Statement date-date, line **9**, one line, column **25**, 8 characters;

Payment date-date, line **11**, one line, column **25**, 8 characters;

Previous balance-currency, line **7**, one line, column **75**, 9 characters;

New charges-currency, line **8**, one line, column **75**, 9 characters;

Other debits-currency, line **10**, one line, column **75**, 9 characters;

Finance charges-currency, line **12**, one line, column **75**, 9 characters;

Payments-currency, line **13**, one line, column **75**, 9 characters;

Other credits-currency, line **14**, one line, column **75**, 9 characters;

New balance-curreny, line **15**, one line, column **75**, 9 characters.

The user also identifies data with variable locations. In this particular example, a variable location is specified as follows:

US 7,075,673 B2

13

Heading 2—line, value="Mail To:"

The identification of Heading **2** as line information means that the system will search for occurrences of the character string "Mail To:" and assign the line number which contains this character string to Heading **2**.

The user also identifies data by relative locations. In this example, the user identifies the following relative location:

Mail To-text, Heading 2+1, 3 lines, column **60**, 25 characters per line.

The instructions above instruct the system to assign the textual information beginning on one line after Heading **2** and continuing for 3 lines, in column **60**, to the Mail To subfile.

As an alternative to inputting the actual line, column, and character numbers, the user can identify desired portions of the document by blocking, or highlighting, the desired portions using the mouse or other input device. In this case, the computer converts the highlighted portions into corresponding line, column, and character numbers.

FIG. **11** lists data corresponding to the hard copy document of FIG. **2** and the associated variable or subfile names.

Next, the user desires to define data relationships in accordance with content instructions. Examples of the type of contents which can be specified by a user are illustrated in FIGS. **12A**, **12B**, and **12C**.

In this particular example, three separate departments of ABC Corporation require information from the XYZ Corporation bill. The first department requires vendor, account number, statement date, payment date, previous balance, new charges, debits, finance charges, payments, and new balance information. The second and third departments require mail to information and previous balance information. Each of these departments have their own application program which utilizes this information.

The user employs content instructions to designate how pieces of information, which have been extracted off of hard copy document **100**, are directed to particular departments, that is, particular application programs. FIG. **12A** illustrates the contents of the information to be transmitted to the first department. FIG. **12B** illustrates the information to be transmitted to the second department. FIG. **12C** illustrates the information to be transmitted to the third department. The content instructions, therefore, parse the information shown in FIG. **11** to various application programs, as shown by FIGS. **12A**, **12B**, and **12C**. Content instructions can also be used to identify additional pieces of data which are required for the input files of the particular application programs. In this particular example, the specific application programs from the three departments all require numeric record number information, numeric horizontal position information, numeric vertical position information, and date received information. The horizontal and vertical position information is used by the application program to specify the location of the received information on a spreadsheet application program, in this example. The user may know in advance the content format required by each application program, that is, in this example, the location and type of information specified on the spreadsheet. The user may also employ the split display mode described with reference to FIG. **3B** to generate content format instructions.

Using the content instructions, the user establishes the following contents for the input file corresponding to FIG. **12A**:

Record number, horizontal position, vertical position, vendor;

Record number, horizontal position, vertical position, account number;

14

Record number, horizontal position, vertical position, statement date;

Record number, horizontal position, vertical position, date received;

Record number, horizontal position, vertical position, payment date;

Record number, horizontal position, vertical position, previous balance;

Record number, horizontal position, vertical position, new charges;

Record number, horizontal position, vertical position, finance charges;

Record number, horizontal position, vertical position, payments;

Record number, horizontal position, vertical position, new balance.

Next, transmission format instructions are employed to define the transmission format of the input file for a specific application program or unit. FIG. **13A** illustrates the transmission input file corresponding to FIG. **12A**. FIG. **13B** illustrates the transmission input file corresponding to FIG. **12B**. FIG. **13C** illustrates the transmission input file corresponding to FIG. **12C**. A comparison of FIGS. **12B** and **12C** reveals that FIGS. **12B** and **12C** have the same contents. However, the information illustrated in FIG. **12B** is being sent to a different application program than the information in FIG. **12C**. These application programs require different transmission input formats, as illustrated in FIGS. **13B** and **13C**. More specifically, the application program that receives the input file illustrated in FIG. **13B** uses the greater than sign as a delimiter whereas the application program which receives the transmission input file shown in FIG. **13C** uses a back-slash as the delimiter.

After the contents and the transmission format for the input file have been defined, and any additional information has been inputted, the input file is assembled and transmitted to the particular application program.

FIG. **14** illustrates another example of a hard copy document containing information to be processed by the instant invention. The hard copy document illustrated in FIG. **14** is first scanned and information from the hard copy document is stored into a memory. The interface **200** then identifies portions of the hard copy document corresponding to various variables by recognizing a defined set of symbols. In the FIG. **14** example, triangles delineate the mailing address, circles delineate the statement date, and squares delineate the new charges. Information from these portions of the hard copy document is stored in the corresponding memory locations or subfiles for each variable. The same set of symbols can be used to identify the same information from one document to the next. Thus, even if the physical formats of documents are not fixed from one document to the next, a diversity of hard copy documents can be processed without manually inputting data by recognition of the defined symbols.

Examples of readily available application programs are Quicken and Lotus 1,2,3 both of which are widely utilized in the business community. Quicken, for example is an easy-to-utilize program for writing checks and preparing business records. Payee, amount and address information may readily be transmitted from scanner memory **220** and/or main memory **250** to the Quicken application program for check writing functions and ledger keeping purposes. Lotus is a well known spreadsheet program which may process data input into specified cells once this data is placed in conventional Lotus format.

US 7,075,673 B2

15   16

Thus, the instant invention provides an integrated and comprehensive system for handling information from a hard copy document, thus permitting a paperless office. In addition, the invention permits data, extracted off of a hard copy document, to be easily manipulated into various logical and transmission formats required by a particular application unit. The invention also provides a low cost system for inputting information from a wide variety of hard copy documents into a memory.

The foregoing description has been set forth merely to illustrate preferred embodiments of the invention and is not intended to be limiting. Modifications are possible without departing from the scope of the invention.

For example, letters, checks, forms, pictures, reports, music scores, film, and other types of hard copy documents can be processed by the invention for accounts payable/receivable accounting, inventory control, record keeping, budgeting, data base management, music transcription, forms processing, computerized art, survey and questionnaire processing, statistical data analysis, correspondence processing and other applications.

Other automated digitizing units can be used in addition to or as an alternative to use of the scanner **210** as an input unit. Any electrical, magnetic, or optical device which extracts information off of a hard copy document, thereby eliminating the need to manually input significant amounts of information from the hard copy document is suitable for use as an automated digitizing unit. In addition, information can be input by user responses and digital and analog signals generated from various devices, and from computer files from other computer systems. Suitable hardware for inputting data includes a keyboard, a light pen, a mouse, a touch screen, a laser scanner, a microphone, a tablet, a disk drive, a magnetic tape drive, and a modem.

The interface **200** can also output information in forms other than a hard copy of textual or image information. For example, the interface **200** can output system responses, computer files, and digital and analog signals for transmission to other computer systems or to control systems. Suitable hardware for outputting information includes a disk drive, a magnetic tape drive, a cathode ray tube, a plasma screen, a printer, a plotter, a film developer, an amplifier, and a modem.

Since modifications of the described embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the scope of the invention should be limited solely with respect to the appended claims and equivalents.

What is claimed is:

1. A system configurable to input information from an electronic document template displayed on a display of a first computer into a plurality of application programs operable on another computer in which said template automatically generates content instructions to extract data and to transmit said data to at least one field in at least one of said plurality of application programs according to customizable transmission format instructions which are dependent upon and compatible with said at least one application program, operating on said other computer, that is receiving said transmitted data.

2. The system as recited in claim **1** in which said system is a distributed computing system.

3. The system as recited in claim **1** wherein said content instructions automatically parse said data to said at least one field in said application program.

4. The system as recited in claim **1** wherein said content instructions are automatically generated using a mouse function.

5. The system as recited in claim **1** wherein said content instructions are automatically generated using speech recognition.

6. The system as recited in claim **1** wherein said content instructions are automatically generated interactively with said user.

7. The system as recited in claim **1** wherein said extracted data comprises billing information.

8. The system as recited in claim **1** wherein said extracted data comprises financial information.

9. The system as recited in claim **1** wherein said extracted data comprises personal information.

10. The system as recited in claim **1** wherein said extracted data comprises customer information.

11. A method of doing business utilizing a computer system configurable to input information from an electronic document template displayed on a display of a first computer into a plurality of application programs operable on another computer comprising the steps of:

displaying an image of the electronic document on the first computer;

utilizing the image of the electronic document of said first computer as said template;

utilizing said template to automatically generate content instructions;

extracting data corresponding to said information from the image of the electronic document utilizing said content instructions;

transmitting said extracted data to at least one field in said at least one of said plurality of application programs on said other computer;

said transmitting being done in accordance with customizable transmission format instructions which are transmission format instructions customizable to be dependent upon and compatible with said at least one of said plurality of application programs operating on said other computer that is receiving said transmitted data.

12. The method as recited in claim **11** further comprising the step of executing the application program on said other computer.

13. The method as recited in claim **11** wherein said extracted data comprises billing information.

14. The method as recited in claim **11** wherein said extracted data comprises financial information.

15. The method as recited in claim **11** wherein said extracted data comprises personal information.

16. The method as recited in claim **11** wherein said extracted data comprises customer information.

17. An interface of a computer system configurable to input information from an electronic document template displayed on a display of a first computer into a plurality of application programs operable on another computer, said interface for inputting and transmitting information comprising:

means for displaying an image of the electronic document on the first computer;

means for utilizing the image of the electronic document of said first computer as said template;

means, utilizing said template, to automatically generate content instructions;

means for extracting data corresponding to said information from the image of the electronic document utilizing said content instructions;

US 7,075,673 B2

17

means for transmitting said extracted data to at least one field in said at least one of said plurality of application programs on an other computer, different from said first computer and in accordance with customizable transmission format instructions which are transmission format instructions customizable to be compatible with said at least one of said plurality of application programs, operating on said other computer, that is receiving said transmitted data.

18. The interface as recited in claim 17 wherein said content instructions are automatically generated interactively with said user.

19. The interface as recited in claim 17 wherein said content instructions are automatically generated using speech recognition.

20. The interface as recited in claim 17 wherein said content instructions are automatically generated using a mouse function.

21. The interface as recited in claim 17 wherein said extracted data comprises billing information.

22. The interface as recited in claim 17 wherein said extracted data comprises financial information.

23. The interface as recited in claim 17 wherein said extracted data comprises personal information.

24. The interface as recited in claim 17 wherein said extracted data comprises customer information.

25. A method utilizing a computer system configurable to input information from an electronic document template displayed on a display of a first computer into a plurality of application programs operable on another computer, said method comprising the steps of:

displaying an image of the electronic document on the first computer;

utilizing the image of the electronic document of said first computer as the template;

utilizing said, template to automatically generate content instructions;

extracting data corresponding to said information from the image of the electronic document utilizing said content instructions;

transmitting said extracted data to at least one field in at least one of said plurality of application programs operable on said other computer;

said transmitting being done in accordance with customizable transmission format instructions which are transmission format instructions customizable to be dependent upon and compatible with said at least one of said plurality of application programs, operating on said other computer that is receiving said transmitted data.

26. The method as recited in claim 25 further comprising the step of executing the application program on said other computer.

27. The method as recited in claim 25 wherein said extracted data comprises billing information.

28. The method as recited in claim 25 wherein said extracted data comprises financial information.

29. The method as recited in claim 25 wherein said extracted data comprises personal information.

30. The method as recited in claim 25 wherein said extracted data comprises customer information.

31. An application program interface for use in data processing in a computer system configurable to input information from an electronic document template displayed on a display of a first computer into a plurality of application programs operable on another computer, said interface comprising:

18

utilities for enabling automatic generation of content instructions using the electronic document template, said content instructions designating data portions of said electronic document template required by at least one of said plurality of application programs;

utilities for enabling formatting of said data portions used by said at least one of said plurality of application programs based on customizable transmission format instructions which are transmission format instructions customizable to be dependent upon and compatible with said at least one of said plurality of application programs; and

utilities for automatically enabling transmission of formatted selected data portions to said at least one of said plurality of application programs, operating on said other computer that is receiving said transmitted data.

32. The application program interface as recited in claim 31, wherein said content instructions automatically parse said data to said at least one field in said application program.

33. The application program interface as recited in claim 31, wherein said content instructions are automatically generated using a mouse function.

34. The application program interface as recited in claim 31, wherein said content instructions are automatically generated using speech recognition.

35. The application program interface as recited in claim 31, wherein said content instructions are automatically generated interactively with said user.

36. The application program interface as recited in claim 31, further comprising utilities for enabling storage of said content instructions.

37. The application program interface as recited in claim 31, wherein said interface operates in a distributed computing system.

38. The application program interface as recited in claim 31, further comprising utilities for enabling definition of said electronic document template for associating portions of said electronic document template with specific variables.

39. The application program as recited in claim 31 wherein said designated data comprises billing information.

40. The application program as recited in claim 31 wherein said designated data comprises financial information.

41. The application program as recited in claim 31 wherein said designated data comprises personal information.

42. The application program as recited in claim 31 wherein said designated data comprises customer information.

43. A method of processing information utilizing a computer system configurable to input information from an electronic document template displayed on a display of a first computer into a plurality of application programs operable on another computer, said method comprising the steps of:

displaying an image of an electronic document on the first computer for inputting information into at least one of said plurality of application programs stored on an other computer according to transmission format instructions;

processing the information by automatically generating content instructions to parse at least a portion of the image to at least one field of information required by said at least one of said plurality of application programs; and

US 7,075,673 B2

19

20

transferring said at least one field of information to said at least one of said plurality of application programs utilizing customizable transmission format instructions which are transmission format instructions customizable to be dependent upon and compatible with said at least one of said application programs, operating on said other computer that is receiving said transmitted data.

44. The method as recited in claim 43 wherein said information comprises billing information.

45. The method as recited in claim 43 wherein said information comprises financial information.

46. The method as recited in claim 43 wherein said information comprises personal information.

47. The method as recited in claim 43 wherein said information comprises customer information.

48. An information processing system configurable to input information from a first computer into a plurality of application programs operable on another computer in which a template document transmitted by said first computer to said other computer includes content instructions to automatically extract data and to transmit said data to at least one field in at least one of said plurality of application programs according to customizable transmission format instructions which are transmission format instructions dependent upon and customizable to be compatible with said at least one of said plurality of applications programs, operating on said other computer that is receiving said transmitted data.

49. The information processing system as recited in claim 48 in which said system is a distributed computing system.

50. The information processing system as recited in claim 48 wherein said content instructions automatically parse said data to said at least one field in said application program.

51. The information processing system as recited in claim 48 wherein said content instructions are automatically generated using a mouse function.

52. The information processing system as recited in claim 48 wherein said content instructions are automatically generated using speech recognition.

53. The information processing system as recited in claim 48 wherein said content instructions are automatically generated interactively with said user.

54. The method as recited in claim 48 wherein said extracted data comprises billing information.

55. The information processing system as recited in claim 48 wherein said extracted data comprises financial information.

56. The information processing system as recited in claim 48 wherein said extracted data comprises personal information.

57. The information processing system as recited in claim 48 wherein said extracted data comprises customer information.

*   *   *   *   *